

ELEVATOR SYSTEM

5 Background of the Invention

Field of the Invention

The invention relates to an elevator system, wherein a hoisting machine is disposed in a hoistway and a car is vertically operated by way of a main rope passed around the hoisting machine.

10 Background Art

In a conventional elevator system, a vibration prevention member formed from vibration prevention rubber is placed on a machine table disposed in a machine room, and the hoisting machine is installed on the vibration prevention member. Thus, the hoisting machine is supported in a vibration-controlled manner, thereby preventing transmission of vibration and noise developing in the hoisting machine.

Installation of the hoisting machine in the conventional elevator system having such a construction presents difficulty in achieving required vibration control operation. Specifically, when a side surface of a drive sheave is placed so as to oppose a wall surface of the hoistway of the elevator system and when the hoisting machine is positioned between the wall surface of the hoistway and an elevator-car, as viewed in horizontally-projected perspective, installation of the vibration prevention member having the foregoing structure cannot be adopted, and therefore vibration control effect is insufficient.

The present invention has been conceived to solve the problem and provides an elevator system which enables easy achievement of required vibration control effect with a construction in which a hoisting machine is installed in a hoistway and a drive sheave opposes a wall surface of the hoistway.

Summary of the Invention

According to one aspect of the present invention, an elevator system comprises a hoisting machine, a drive sheave, a fixing member and a mount member. The hoisting machine is disposed within a hoistway between a wall surface of the hoistway and a car, when viewed in horizontally-projected perspective. The hoisting machine includes the drive sheave as a main element thereof. The fixing member is formed in pillar form and is provided upright from the bottom portion of the hoistway. The mount member supports the hoisting machine, and is fastened to an upper portion of the fixing member.

In another aspect of the invention, in the elevator system, the mount member is formed into a hollow square shape and support sections for supporting the hoisting machine are provided at the upper and lower portions of the mount member.

In another aspect of the invention, in the elevator system, the mount member is preferably attached to upper portions of the fixing members provided upright from a base member on the bottom of the hoistway, and the base member is provided for standing elevator rails.

In another aspect of the invention, in the elevator system, securing member is provided on the fixing member which is provided upright from the bottom portion of the hoistway, and the securing member is secured to the wall of the hoistway.

Other and further objects, features and advantages of the invention will appear more fully from the following description.

Brief Description of the Drawings

Fig. 1 is a transverse plan view of a hoistway or a elevator shaft of an elevator system in the present invention;

Fig. 2 is a front view when viewed in the direction of the arrow A in Fig. 1;

Fig. 3 is a left side view of Fig. 2;

Fig. 4 is a front view of a hoisting machine and a mount member shown in a separated way;

Fig. 5 is a left side view of Fig. 4; and

Fig. 6 is a perspective view of a hoisting machine and a mount member shown in a separated way.

5 Detailed Description of the Preferred Embodiment

Figs. 1 through 6 show an embodiment of the present invention. Fig. 1 is a transverse plan view of a hoistway or a shaft in an elevator system according to the present invention; Fig. 2 is a front view when viewed in the direction of the arrow A in Fig. 1; and Fig. 3 is a left
10 side view of Fig. 2. Further, Fig. 4 is a front view of a hoisting machine and a mount member shown in a separated way; Fig. 5 is a left side view of Fig. 4; and Fig. 6 is a perspective view of a hoisting machine and a mount member shown in a separated way.

As shown in the drawings, in a hoistway 1 for an elevator, a pair
15 of car rails 2 is provided upright and spaced apart from each other, and a car 3 is provided between the car rails 2. A pair of counterweight rails 4 is provided upright within the hoistway 1 and spaced apart from each other.

A buffer mount 5 is placed on the bottom floor of the hoistway
20 1 corresponding to a counterweight, not shown, placed between the counterweight rails 4. A pair of fixing members 6 is formed from two pillars provided upright on the buffer mount 5. Upper ends of the fixing members 6 are linked together and secured on the wall of the hoistway 1 by means of a securing member 7.

Amount member 8 is fastened to the upper ends of the fixing members
25 6. The mount member 8 is formed from a frame member, and is made by assembling a steel product into a hollow square shape. Support sections 9 are attached to respective upper and lower ends of the mount member 8. Preferably, four support sections 9 are provided close to four inner
30 corners of the mount member 8 as clearly seen in Fig. 4 or Fig. 6.

A hoisting machine 10 has a drive sheave 11 and is held in a housing. Four mount sections 12 are provided on the housing so as to correspond

to the respective support sections 9 of the mount member 8. The hoisting machine 10 is placed close to the mount member 8, and each of the mount sections 12 is placed to oppose to a lower side of the respective support section 9.

5 Each of vibration prevention members 13 is interposed between the support section 9 of the mount member 8 and the mount section 12 of the hoisting machine 10 respectively. The vibration prevention member 13 is preferably formed from vibration prevention rubber. Each of the mount sections 12 comes close to each of the support sections 10 9 from under side of the support sections 9. The support section 9 and the mount section 12 are connected via a vibration prevention member 13 in between. Thus, the hoisting machine 10 is connected to the mount member 8 with its drive sheave 11 opposed to the mount member 8.

 A main rope 14 is passed around the drive sheave 11. Although 15 omitted from the drawings, one end of the main rope 14 is passed around a pulley, which is rotatably attached to the top of the hoistway 1, and is connected to a car 3. The other end of the main rope 14 is passed around another pulley, which is rotatably attached to the top of the hoistway 1, and is connected to a counterweight not shown.

20 In the elevator system having the foregoing construction, the hoisting machine 10 is placed between the wall surface of the hoistway 1 and the car 3, and the front surface of the drive sheave 11 is placed so as to oppose the wall surface of the hoistway 1. The hoisting machine 10 is supported within the hoistway 1 by means of the mount member 8 25 via the vibration prevention members 13 placed on the mount sections 12 provided at the four corners of the hoisting machine 10.

 By means of such a construction, the hoisting machine 10 is supported within the hoistway 1 through the vibration prevention members 13. The vibration prevention members 13 are compressed by 30 upwardly-oriented load acting on the hoisting machine 10, thereby yielding vibration control effect. Further, the torque exerted on the hoisting machine 10 is supported by horizontal rigidity of the vibration

prevention members 13. Consequently, the hoisting machine 10 is supported on the mount member 8 without involvement of any failure. The required effect for controlling vibration of the hoisting machine 10, which would be yielded by the vibration prevention members 13, is readily achieved. As a result, noise or vibration, which is inducted at the time of operation of the elevator installed in a building having the hoistway 1 provided therein, can be eliminated.

In the embodiment shown in Figs. 1 through 6, four vibration prevention members 13 are provided at the upper and lower ends of the housing of the hoisting machine 10. Therefore, the vibration prevention members 13 can be made compact, thereby curtailing the space required to install the hoisting machine 10. Consequently, the space required to construct the hoistway 1 is reduced, thereby curtailing the cost for installing the elevator system.

In the embodiment shown in Figs. 1 through 6, the mount member 8 is formed from a frame member and has a rectangular hollow shape. The vibration prevention members 13 are placed at four corners within the frame of the mount members 8. Therefore, the load of the hoisting machine 10 can be supported by the mount member 8 which is formed from the minimum number of structure members. Consequently, the space required to install the hoisting machine 10 can be reduced, and hence the space required to form the hoistway 1 is reduced, thereby lowering the cost for constructing the elevator system.

In the embodiment shown in Figs. 1 through 6, the mount member 8 is provided on the fixing members 6 provided upright on the buffer mount 5. Therefore, upwardly-oriented load acting on the hoisting machine 10 is transmitted to the buffer mount 5. On the other hand, downwardly-oriented load acts on the counterweight rails 4 by way of the counterweight-side pulley provided on the counterweight rails 4 standing upright on the buffer mount 5 and around which the main rope 14 is passed. Therefore, the load acting on the counterweight rails 4 cancels the upwardly-oriented load acting on the buffer mount 5.

Consequently, the mount member 8 can be provided without a necessity for a special member for supporting the mount member 8 on the wall of the hoistway 1. As a result, the mount member 8 can be readily provided in the hoistway 1, thereby curtailing the cost for manufacturing and installing the mount member 8.

In the embodiment shown in Figs. 1 through 6, the securing member 7 is connected to the fixing members 6 and secured to the wall of the hoistway 1, so that the fixing members 6 are secured to the wall of the hoistway 1 via the securing hardware 1. Therefore, during an installation operation of the elevator system, any load to be lifted can be supported by only the securing member 7. Thus, various components of the elevator system may be lifted by use of the hoisting machine 10 used as a winch. Hence, the efficiency of installation operation is improved, thereby curtailing installation costs.

In the embodiment shown in Figs. 1 through 6, the securing member 7 is attached to the fixing members 6, and the fixing members 6 are secured on the wall of the hoistway 1 by way of the securing member 7. Hence, the fixing members 6, although formed from two pillars, may be prevented from rolling or swaying. Thus, the structure of the fixing members 6 can be simplified, thereby reducing construction costs.

In the embodiment shown in Figs. 1 through 6, the mount member 8 is placed on and connected to the fixing members 6 provided upright on the buffer mount 5. Usually a pit depth is varied in accordance with the speed of the elevator. When a pit depth is varied, the fixing members 6 may be manufactured so as to assume a height corresponding to the pit depth by means of the foregoing simple construction. The hoisting machine 10 may be installed by combination of the mount member 8 and the fixing members 6 previously prepared corresponding to the pit depth. As a result, manufacturing costs can be curtailed.

As a result, the hoisting machine is placed between the wall surface of the hoistway and the car when viewed in horizontally-projected perspective, and the drive sheave is placed so as to oppose the wall

surface of the hoistway. By means of the vibration prevention members placed on the upper and lower sections on the surface of the mount frame facing the hoisting machine, the hoisting machine is fixedly supported within the hoistway. The effect of controlling vibration yielded by
5 the vibration prevention members is achieved, and the torque acting on the hoisting machine is supported by the horizontal rigidity of the vibration prevention member. Consequently, the hoisting machine is supported on the mount member without failure. Further, the required vibration control effect of the vibration prevention member is readily
10 achieved. Noise and vibration, which arise during operation of an elevator in a building where the hoistway is installed, are diminished, thereby rendering an environment silent.

As a result, the vibration prevention member can be made compact, thereby reducing the space required to install the hoisting machine.
15 The space required to construct a hoistway is reduced, thereby yielding an effect for curtailing the cost of installing an elevator system.

As a result, the load acting on the hoisting machine can be supported by means of the mount member formed from the minimum number of members. Consequently, the space required to install the hoisting machine can
20 be reduced, and the space required to construct a hoistway is diminished, thereby yielding an effect for curtailing the cost of installing an elevator system.

Although the upwardly-oriented load acting on the hoisting machine is transmitted to the buffer mount, the upwardly-oriented load acting
25 on the buffer mount is cancelled by the load which acts on the counterweight rails provided upright on the buffer mount by way of a counterweight pulley around which the main rope is passed. Consequently, a mount member can be placed without involvement of a necessity for a special member for supporting the mount member on the wall of the hoistway.
30 Therefore, the mount member can be readily placed in the hoistway, thereby yielding an effect of reducing the cost for manufacturing and installing the mount member.

In relation to a variation in the pit depth of a hoistway, which is set in accordance with the speed of an elevator, fixing members are manufactured so as to assume a height corresponding to the pit depth by means of the foregoing construction. A hoisting machine is installed
5 by combination of the mount member and the fixing members of given height previously-prepared corresponding to the pit depth. As a result, there is yielded an advantage of the ability to curtail manufacturing costs.

As a result, instruments of the elevator system are lifted by use of the hoisting machine used as a winch during an installation
10 operation; load to be lifted can be supported by only the securing member. Hence, there is yielded an advantage of the ability to curtail installation costs by improving the efficiency of installation operation.

Obviously many modifications and variations of the present
15 invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

The entire disclosure of a Japanese Patent Application No. 2000-282966, filed on March 11, 2000 including specification, claims,
20 drawings and summary are incorporated herein by reference in its entirety.